

The Kinetics of Gas-phase Reactions of Selected Monoterpenes and Cycloalkenes with Ozone and Nitrate Radicals Studied by Headspace Solid-Phase Microextraction (HS-SPME)

S. Almabrok, G. Marston and C. Pfrang

Department of Chemistry, University of Reading, Reading, Berkshire, RG6 6AD, UK

Keywords: Relative rate technique, HS-SPME, Monoterpenes.

Presenting author email: [s.h.almabrok@reading.ac.uk](mailto:s.h.almabrok@reading.ac.uk)

Oxidation of volatile organic compounds in the troposphere is primarily initialised by hydroxyl radicals, ozone, and nitrate radicals,  $\text{NO}_3$ , with the dominant degradation route being determined by the relative concentrations of the oxidants as well as the rate coefficients for the reactions of the oxidised compounds with these species<sup>(1)</sup>. In this study, a novel variant of the relative rate method has been employed to measure the room-temperature rate coefficients for the gas-phase reactions of ozone and  $\text{NO}_3$  with selected monoterpenes and cycle-alkenes with structural similarities to monoterpenes. Measurements were carried out at  $298 \pm 2$  K and  $760 \pm 10$  Torr. The experimental results were obtained by combining headspace solid-phase microextraction (HS-SPME) sampling with gas chromatography-mass spectrometry (GC-MS) detection. The experimental set-up is depicted in Fig. 1. Fig. 2 (a) illustrates the HS-SPME calibration for  $\alpha$ -pinene while Fig. 2 (b) gives an example of a kinetic plot used for derivation of the rate coefficients.

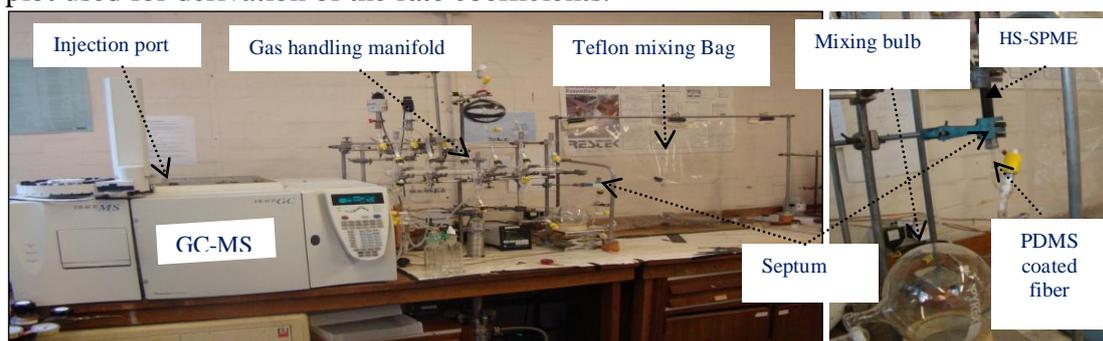


Figure.1: Experimental set up for combining HS-SPME with GC-MS analysis.

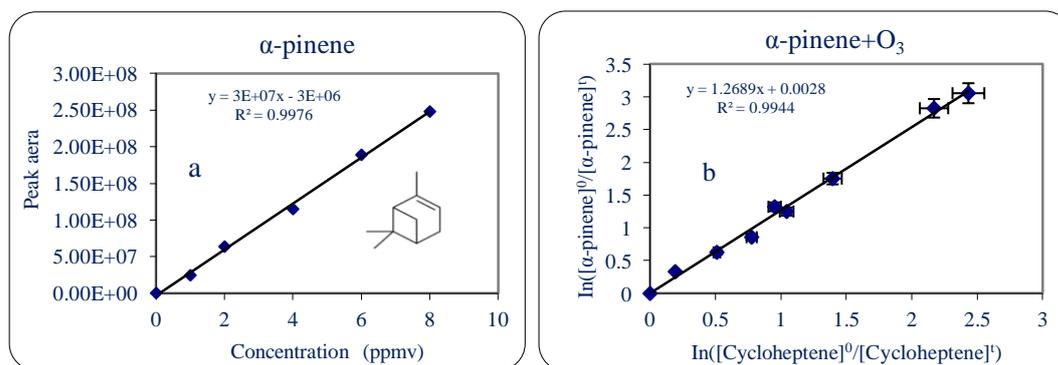


Figure 2 (a & b): (a): Calibration of  $\alpha$ -pinene using HS-SPME and (b) Relative rate plot reacting  $\text{O}_3$  with  $\alpha$ -pinene vs. cyclohepten (Reference compound).

References.

- 1- B.J. Finlayson-Pitts and J.N. Pitts Jr., *Chemistry of the Upper and Lower Atmosphere*, Academic Press, San Diego, 2000.